

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listing, of claims in the application:

1. (Currently Amended) A polishing method for polishing an object having a film on a surface to be polished, comprising the steps of
measuring data corresponding to a thickness of the film on the object and
making a relatively small cathode member compared with ~~the surface face a~~
~~region of the~~ an overall surface, interposing an electrolytic solution at least between that
region of the surface ~~and corresponding to~~ the cathode member, and in that state applying a
voltage with the cathode member serving as a cathode and the film as an anode to
electrolytically polish and flatten the film by electrolytic elution in that region of the surface
preferentially ~~from projecting portions of the film~~ until removing a target amount of the film
~~obtained from the thickness equivalent data; wherein~~ wherein an electric current, voltage or
resistance measurement associated with the electrolytic polishing is used to determine when a
target amount has been removed; and
~~the process of moving~~ the cathode member to another region of the surface
and electrolytically polishing the film in that other region until removing the target amount of
film to flatten the film is repeated over the entire surface, to thereby remove the target
amount of film over the entire surface.
2. (Original) A polishing method as set forth in claim 1, wherein the film
comprises a copper film.
3. (Original) A polishing method as set forth in claim 1, further comprising a
step of calculating the amount of the film to be removed from the thickness equivalent data
after the step of measuring the thickness equivalent data and before the step of electrolytically
polishing and flattening the film by electrolytic elution in that region of the surface.

4. (Original) A polishing method as set forth in claim 1, wherein the cathode member is moved continuously from one region to another region of the surface.

5. (Original) A polishing method as set forth in claim 4, wherein the speed of movement of the cathode member is controlled in accordance with the target amount of the film to be removed obtained from the thickness equivalent data.

6. (Original) A polishing method as set forth in claim 1, wherein the cathode member is moved stepwise from one region to another region of the surface.

7. (Currently Amended) A polishing method as set forth in claim 1, wherein, as the thickness equivalent data of the film is based on an actual measurement, ~~the thickness of the film is measured.~~

8. (Currently Amended) A polishing method as set forth in claim 1, wherein, in the step of measuring the thickness equivalent data of the film, the thickness equivalent data of the film in the region where the cathode member faces the surface is measured, and

~~the process of prior to~~ moving the cathode member to another region of the surface, measuring the thickness equivalent data of the film in that other region, and electrolytically polishing and flattening the film by electrolytic elution preferentially from projecting portions of the film in that other region until removing the target amount of the film obtained from the thickness equivalent data is repeated over the entire surface.

9. (Original) A polishing method as set forth in claim 8, wherein,

in the step of measuring the thickness equivalent data of the film, as the thickness equivalent data of the film, an electrolytic current of the electrolytic polishing is measured in the region where the cathode member faces the surface, and

in the step of electrolytically polishing and flattening the film by electrolytic elution in that region of the surface, the electrolytic polishing is performed until removing the target amount of the film determined by the electrolytic current of the electrolytic polishing.

10. (Original) A polishing method as set forth in claim 9, wherein, in the step of electrolytically polishing and flattening the film by electrolytic elution in that region of the surface, the target amount of the film remaining at the point of time when the electrolytic current of the electrolytic polishing becomes a specified value is determined to be zero and the electrolytic polishing in that region of the surface is finished.

11. (Original) A polishing method as set forth in claim 1, wherein, the cathode member is shaped so as to be able to apply a stronger electric field to a projecting portion than to a recessed portion of the film corresponding to the unevenness of the film in that region of the surface, and

in the step of electrolytically polishing and flattening the film by electrolytic elution in that region of the surface, by applying this electric field, the film is polished electrolytically and flattened by electrolytic elution in the region of the surface preferentially from a projecting portion of the film.

12. (Currently Amended) A polishing method as set forth in claim 11, wherein the surface has a projecting and recessed pattern ~~formed by repeating a projecting and recessed pattern in that region of the surface, and~~ by moving the cathode member stepwise to other regions of the surface and applying the stronger electric field to the projecting portion than to the recessed portion of the

film corresponding to the unevenness of the film ~~in these other regions~~, the step of electrolytically polishing and flattening the film by electrolytic elution preferentially ~~from~~ at projecting portions of the film is repeated over the entire surface.

13. (Currently Amended) A polishing method as set forth in claim 1, wherein the cathode member is divided into a plurality of regions which are ~~arranged~~ insulated from each other and the cathode member as a whole faces the entire surface, and by changing the position of application of voltage ~~to the divided cathode member~~, the substantially equivalent is obtained as when changing the position of the cathode member facing the surface from one region to another region.

14. (Original) A polishing method as set forth in claim 13, wherein the cathode member is divided into a plurality of concentric circular regions, and the entire surface is electrolytically polished by changing the position of application of voltage from the inner side to the outer side of the cathode member divided into concentric circular regions.

15. (Currently Amended) A polishing method as set forth in claim 1, wherein, when making a relatively small cathode member compared with ~~the surface face~~ that region of the surface, an anode member set apart from the cathode member at a certain distance is made to face the surface, an electrolytic solution is interposed at least between that region of the surface and the cathode member and between the surface and the anode member, and a voltage is applied to the cathode member and the anode member ~~so as to apply the voltage de facto with the cathode member as a cathode and the surface as an anode.~~

16. (Original) A polishing method as set forth in claim 15, wherein the anode member is comprised of a nobler metal than the material on the surface.

17. (Original) A polishing method as set forth in claim 1, wherein, in the step of electrolytically polishing and flattening the film by electrolytic elution in that region of the surface, chemical mechanical polishing is performed at the same time as the electrolytic polishing to flatten the film by composite polishing combining the electrolytic polishing and the chemical mechanical polishing.

18. (Original) A polishing method as set forth in claim 1, wherein, when a voltage is applied with the cathode member as a cathode and the surface as an anode, a direct-current voltage is applied.

19. (Original) A polishing method as set forth in claim 18, wherein a rectangular pulse voltage is applied.

20. (Original) A polishing method as set forth in claim 15, wherein, when a voltage is applied to the cathode member and the anode member, an alternating-current voltage is applied.

21. (Original) A polishing method as set forth in claim 1, wherein, in the step of electrolytically polishing and flattening the film by electrolytic elution in that region of the surface, an electrolytic current of the electrolytic polishing in the region is measured at the same time.

22. (Original) A polishing method as set forth in claim 21, wherein the voltage applied with the cathode member as a cathode and the surface as an anode is controlled to maintain the electrolytic current constant.

23. (Original) A polishing method as set forth in claim 21, wherein the progress in flattening the film in that region of the surface is managed through the electrolytic current.

24. (Currently Amended) A polishing method for polishing an object having a film on a surface to be polished, comprising the steps of
measuring data corresponding to a thickness of the film on the object;
making a relatively small cathode member compared with ~~the surface face a~~
~~region of the an entire~~ surface, interposing an electrolytic solution including a chelating agent at least between that region of the surface and the cathode member, and in that state applying a voltage with the cathode member serving as a cathode and the film as an anode to oxidize the surface of the film by anodic oxidation and form a chelate film of the oxidized material;
and

selectively removing a projecting portion of the chelate film corresponding to unevenness of the film to expose the film of the projecting portion at the surface; ~~wherein~~
~~a step of~~ and moving the cathode member from one region to an other region of the surface, and repeating the chelate film forming step, and the chelate film removing step ~~are repeated~~ until removing the target amount of the film determined from the thickness equivalent data over the entire surface to flatten the entire surface.

25. (Original) A polishing method as set forth in claim 24, wherein the film comprises a copper film.

26. (Original) A polishing method as set forth in claim 24, wherein the electrolytic solution further includes a surface-active agent.

27. (Original) A polishing method as set forth in claim 24, further comprising a step of calculating the target amount of the film to be removed from the thickness equivalent data after the step of measuring the thickness equivalent data and before the chelate film forming step in that region of the surface.

28. (Original) A polishing method as set forth in claim 24, wherein the cathode member is moved continuously from one region to another region of the surface.

29. (Original) A polishing method as set forth in claim 28, wherein the speed of movement of the cathode member is controlled in accordance with the target amount of the film to be removed obtained from the thickness equivalent data.

30. (Original) A polishing method as set forth in claim 24, wherein the cathode member is moved stepwise from one region to another region of the surface.

31. (Original) A polishing method as set forth in claim 24, wherein, as the thickness equivalent data of the film, the thickness of the film is measured.

32. (Original) A polishing method as set forth in claim 24, wherein,
in the step of measuring the thickness equivalent data of the film, the thickness equivalent data of the film in the region where the cathode member faces the surface is measured, and

the step of moving the cathode member to other regions of the surface, the step of measuring the thickness equivalent data of the film in these other regions, the chelate film forming step, and the chelate film removing step are repeated over the entire surface.

33. (Original) A polishing method as set forth in claim 32, wherein, in the step of measuring the thickness equivalent data of the film, as the thickness equivalent data of the film, an electrolytic current of the anodic oxidation is measured in the region where the cathode member faces the surface, and the step of measuring an electrolytic current of the anodic oxidation, the chelate film forming step, and the chelate film removing step are repeated over the entire surface until removing the target amount of the film determined by the electrolytic current of the anodic oxidation.

34. (Original) A polishing method as set forth in claim 33, wherein, when repeating the step of measuring the electrolytic current of the anodic oxidation in a region of the surface, the chelate film forming step, and the chelate film removing step over the entire surface, the target amount of the film remaining at the point of time when the electrolytic current of the anodic oxidation becomes a specified value is determined to be zero and the chelate film forming step and the chelate film removing step in that region of the surface are finished.

35. (Original) A polishing method as set forth in claim 24, wherein the cathode member is shaped so as to be able to apply a stronger electric field to a projecting portion than to a recessed portion of the film corresponding to the unevenness of the film in that region of the surface, and

in the chelate film forming step and the chelate film removing step in that region of the surface, by applying this electric field, the chelate film is formed and removed preferentially from projecting portions of the film to flatten the film.

36. (Original) A polishing method as set forth in claim 35, wherein
the surface has a projecting and recessed pattern formed by repeating a projecting and recessed pattern in that region of the surface, and
by moving the cathode member stepwise to other regions of the surface and applying the stronger electric field to the projecting portion than to the recessed portion of the film corresponding to the unevenness of the film in these other regions, the step of chelating the film and removing the formed chelate film preferentially from a projecting portion of the film to flatten the film is repeated over the entire surface.

37. (Original) A polishing method as set forth in claim 24, wherein
the cathode member is divided into a plurality of regions which are arranged insulated from each other and the cathode member as a whole faces the entire surface, and
by changing the position of application of a voltage to the divided cathode member, the substantially equivalent is obtained as when changing the position of the cathode member facing the surface from one region to another region.

38. (Original) A polishing method as set forth in claim 37, wherein
the cathode member is divided into a plurality of concentric circular regions,
and
the entire surface of the film is oxidized by anodic oxidation and chelated by changing the position of application of a voltage from the inner side to the outer side of the cathode member divided into concentric circular regions.

39. (Original) A polishing method as set forth in claim 24, wherein, when making a relatively small cathode member compared with the surface face that region of the surface, an anode member set apart from the cathode member at a certain distance is made to face the surface, an electrolytic solution is interposed at least between that region of the surface and the cathode member and between the surface and the anode member, and a voltage is applied to the cathode member and the anode member so as to apply the voltage de facto with the cathode member as a cathode and the surface as an anode.

40. (Original) A polishing method as set forth in claim 39, wherein the anode member is comprised of a nobler metal than the material on the surface.

41. (Original) A polishing method as set forth in claim 24, wherein, in the step of removing the chelate film in that region of the surface, a projecting portion of the chelate film corresponding to the unevenness of the film is selectively removed by wiping.

42. (Original) A polishing method as set forth in claim 24, wherein, in the step of removing the chelate film in that region of the surface, the chelate film is removed by applying vibration.

43. (Original) A polishing method as set forth in claim 24, wherein, in the step of removing the chelate film in that region of the surface, the chelate film is removed by applying a jet.

44. (Original) A polishing method as set forth in claim 24, wherein, when a voltage is applied with the cathode member as a cathode and the surface as an anode, a direct-current voltage is applied.

45. (Original) A polishing method as set forth in claim 44, wherein a rectangular pulse voltage is applied.

46. (Original) A polishing method as set forth in claim 39, wherein, when a voltage is applied to the cathode member and the anode member, an alternating-current voltage is applied.

47. (Original) A polishing method as set forth in claim 24, wherein, in the step of oxidizing the film by the anodic oxidation in that region of the surface, an electrolytic current of the anodic oxidation in the region is measured at the same time.

48. (Original) A polishing method as set forth in claim 47, wherein the voltage applied with the cathode member as a cathode and the surface as an anode is controlled to maintain the electrolytic current constant.

49. (Original) A polishing method as set forth in claim 47, wherein the progress in flattening the film in that region of the surface is managed through the electrolytic current.

Claims 50-91 (Canceled) Claims 50-91 were previously canceled.